# Correct the 40 multiple choice questions from the placement test:

### **Solutions**



16.  $\frac{1}{(8x^{2})^{1/3}} = \frac{1}{(4x^{2})^{1/2}} = \frac{1}{(6y^{2})^{1/3}} = \frac{1}{(6y^{2})^{1$ 

$$\frac{2}{(x+2)} = \frac{1}{(x+2)}$$

$$\frac{(x+2)(x+2)}{(x+2)}$$

$$\frac{(x+2)(x+2)}{(x+2)}$$

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$$\frac{(x+2)(x+2)}{(x+2)}$$

# **Complex Numbers**

Look at the following equation...

$$x + 1 = 0$$
,  $x \in W$  ———— No Solution over the whole numbers

If we extend to the integers or real number systems then there will be a solution.

What about the equation  $x^2 + 1 = 0$ ,  $x \in \mathbb{R}$ ?

$$x^2 = -1$$

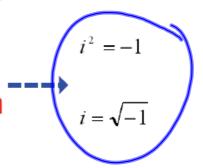
$$x = \sqrt{-1}$$
 ???

13+0

There is no solution over the real number system, therefore we extend into a new number system...the Complex Numbers.

So what about this "i" that appears?

Most Important prinicple in complex number system



What is 
$$\sqrt{-36}$$
?
$$\sqrt{36} (-1)$$

$$\sqrt{36}$$

$$+ 6$$

#### **Basic Operations involving Complex Numbers**

#### I. Addition and Subtraction

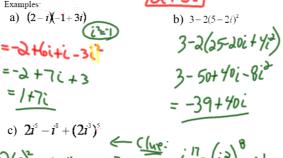
$$(a+bi)+(c+di)=(a+c)+(b+d)i$$
Collect "real" terms Collect "imaginary" terms

Example:

Express the following complex expression in standard form:

$$2(3-5i)-(7-5i)+2(-1+i)$$
= 6-10i-7+5i-2+2i
= 3-3;

#### II. Multiplication and Powers



c) 
$$2i^{5} - i^{8} + (2i^{3})^{5} \leftarrow (lue)^{7} + 32(i^{3})^{7} \in (lue)^{7} + 32(i^{3})^{7} \in (lue)^{7} + 32(i^{3})^{7} \in (lue)^{7} = (lue)$$

#### III. Division

Before we can divide we must first review the concept of conjugates...

$$a + bi \Leftrightarrow a - bi$$

Examine what happens when you multiply complex conjugates...

$$(2-5i)(2+5i)$$

## Now we are ready to try division...

Example:  
a) 
$$\frac{2+4i}{1-i} (\frac{1+i}{1+i})$$

$$= \frac{2+6i+4i}{1-i^2}$$

$$= \frac{2+6i+4i}{1-i^2}$$

$$= \frac{2+6i}{1-i^2}$$

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$$= \frac{2+6i}{1-i^2}$$



Answers to Sample Placement Test.htm